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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/462,109	12/30/1999	MASAHIKO HIROSE		4688

22511 7590 06/04/2002

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EXAMINER
ROCHE, LEANNA M

ART UNIT	PAPER NUMBER
1771	15

DATE MAILED: 06/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/462,109	HIROSE ET AL.	
	Examiner	Art Unit	
	Leanna Roche	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The amendments filed March 4, 2002 have been entered and carefully considered. Claims 1-3 and 5 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomaschke et al. (USPN 5254261), Rice et al. (USPN 6132804), Hirose et al. (JP 10-33958), or Hirose et al. (JP 10-33959) in view of Hashino et al. (USPN 4208508) and Hancock et al. (USPN 5700903).

Tomaschke, Rice, JP 10-33958, and JP 10-33959 each disclose a composite reverse osmosis membrane comprising a polyamide layer on a porous support. Each discloses at least one example having a sodium chloride rejection of at least 98 percent and a water flux of at least 0.5 $m^3/m^2 \cdot day$. Each reference also discloses a water flux of at least 0.6 $m^3/m^2 \cdot day$. The polyamide layer in Tomaschke, Rice, JP 10-33958, and JP 10-33959 may be prepared from polyfunctional acyl halides having at least two reactive acid halide groups reacted with compounds bearing at least two reactive amino groups.

Tomaschke, Rice, JP 10-33958, and JP 10-33959 do not specifically disclose the value of the water contact angle between the polyamide layer surface and water. However, it is well known in the art of semipermeable membranes that the smaller the water contact angle the greater the hydrophilicity and wettability of the membrane (Hashino et al. USPN 4208508 Column 6 lines 57-68). Hashino also discloses that membranes having a water contact angle of less than 65° are easily wettable and bubbles are difficult to absorb on their surface resulting in increased water permeability (Column 2, lines 9-19). Hancock discloses that a hydrophilic and wettable surface on a porous polymer promotes uniform filtration and increase the recovery of both filtrate and retentate. Hancock also discloses that a low water contact angle is the measurement used to indicate hydrophilicity in polymeric articles useful in reverse osmosis (Column 4 line 57- Column 5 line 7). Therefore, it would have been obvious to the skilled artisan at the time the invention was made to produce a polyamide skin layer having a water contact angle of no more than 40°, since it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

In the present case, it would have been obvious to reduce the water contact angle of the polyamide layer, motivated by the desire to increase the hydrophilicity of the polyamide layer, and thus, to increase the water permeability of the membrane, improve the uniformity of the filtration and increase recovery of the filtrate (water) and the retentate (sodium chloride).

4. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cadotte et al. (USPN 4888116) in view of Hashino et al. (USPN 4208508) and Hancock et al. (USPN 5700903).

Cadotte discloses a composite reverse osmosis membrane comprising a polyamide layer on a porous support. Example 16 of Cadotte teaches sodium chloride rejection of at least 98 percent and a water flux of at least 0.5 $m^3/m^2 \cdot$day. The polyamide layer of Cadotte may be prepared from polyfunctional acyl halides having at least two reactive acid halide groups reacted with compounds bearing at least two reactive amino groups.

Cadotte does not specifically disclose the value of the water contact angle between the polyamide layer surface and water. However, it is well known in the art of semipermeable membranes that the smaller the water contact angle the greater the hydrophilicity and wettability of a membrane (Hashino et al. USPN 4208508 Column 6 lines 57-68). Hashino also discloses that membranes having a water contact angle of less than 65° are easily wettable and bubbles are difficult to absorb on their surface resulting in increased water permeability (Column 2, lines 9-19). Hancock discloses that a hydrophilic and wettable surface on a porous polymer promotes uniform filtration and increase the recovery of both filtrate and retentate. Hancock also discloses that a water contact angle is the measurement used to indicate hydrophilicity in polymeric articles useful in reverse osmosis (Column 4 line 57- Column 5 line 7). Therefore, it would have been obvious to the skilled artisan at the time the invention was made to produce a polyamide skin layer having a water contact angle of no more than 40°, since

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

lmr
May 24, 2002

TERREL MORRIS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

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